The Effect of Prescription Drug Copayments on Utilization and Associated Overall Costs

By
Michael B. Zell

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First Reader _____

Second Reader _____

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Abstract

The purpose of this research is to study the effect of an increase in prescription drug copayments on utilization and associated costs. Using a cross-sectional, time series, cohort study design consisting of 2,389 members continuously enrolled for 24 months, from one large employer enrolled in a Midwest HMO, this study compares 1998 prescription drug costs and utilization when there was a $0 copay, to 1999 costs and utilization after a $5 copay was implemented.

Using the difference-of-means test, empirical results indicate that:

1) Drug utilization (measured by prescription claims PMPY) declined from 1998 to 1999 but the decline was not statistically significant.
2) Total drug costs PMPY increased significantly (at the 1% level) from 1998 to 1999 because of an increased use of brand over generic drugs, which led to a statistically significant increase in ingredient cost.
3) However, overall drug costs to the HMO showed a statistically significant decrease of 1.6% from 1998 to 1999 for three reasons:
    a) The $5 copayment was introduced in 1999.
    b) There was a statistically significant decrease in fill fee PMPY to the HMO from 1998 to 1999.
    c) There was a statistically significant increase in the add-in-fee PMPY from 1998 to 1999.

These three factors all contributed to the statistically significant reduction in prescription drug costs to the HMO from 1998 to 1999.

Therefore, this study shows that an increase in a prescription drug copayment can provide substantial savings to both employers and HMOs without becoming a deterrent to overall utilization.

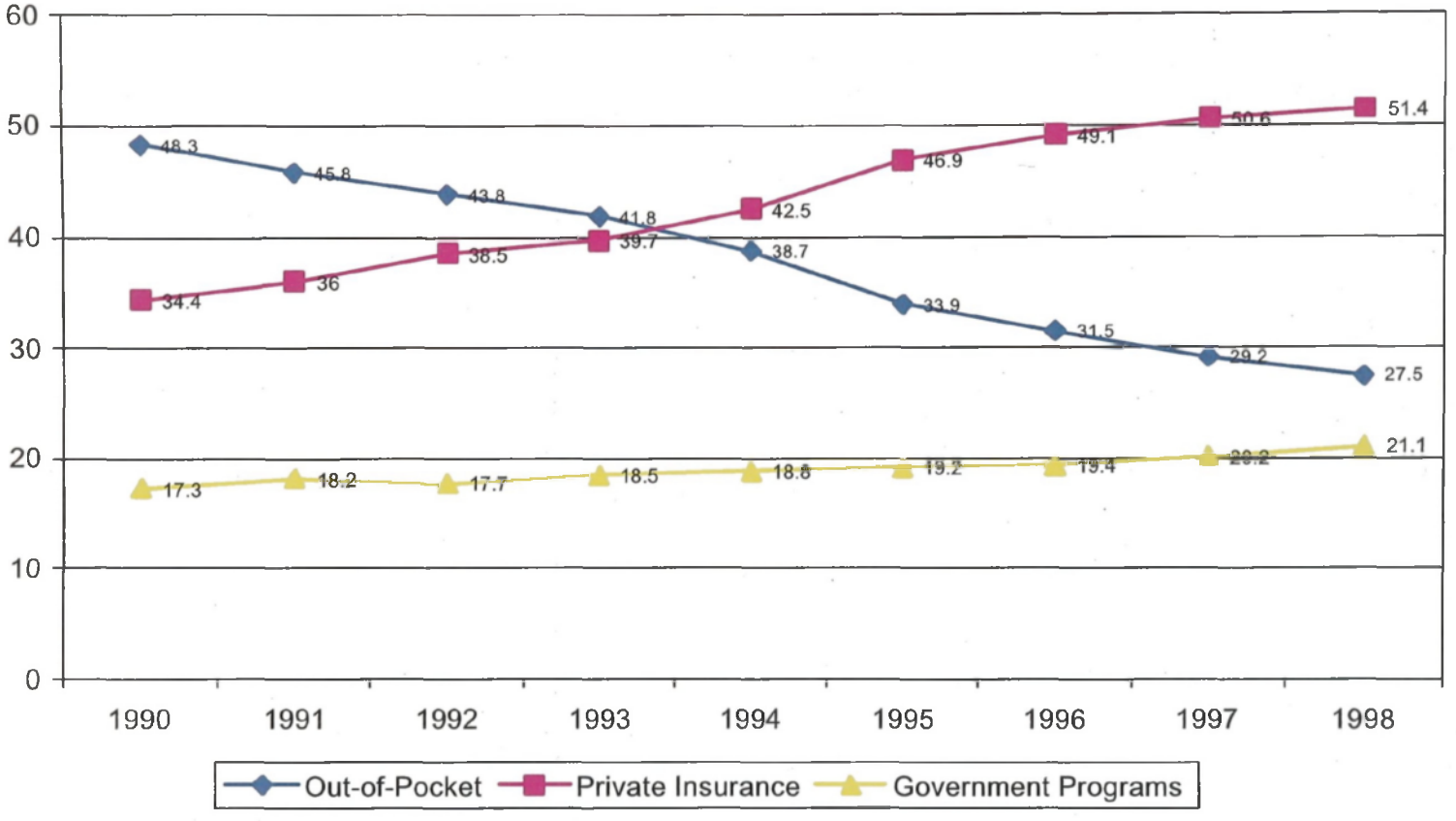
Introduction: The Problem

With an employer-based health care system and restricted corporate budgets, rising health care costs could spell the end of the prescription drug benefit for many Americans. Pharmaceutical costs have risen sharply as advances in technology and the demands of an aging population spur the creation and consumption of expensive new drugs. If we expect to enjoy continuing prescription drug coverage through our employers, we must find ways to control expenses and limit the excessive use of prescription drugs. Figure 1[1] shows the trend of prescription drug expenditures by payer from 1990-1998, as well as the dramatic shift from out-of-pocket expense to private insurance.

As the population continues to age, we will consume more, and spend more, on prescription drugs (figure 2). Since managed care organizations dominate the health care landscape and advocate more aggressive treatment of disease states, recommended treatment guidelines will certainly add to the number of prescriptions written. Most significant, perhaps, is that the average human life span has increased from 47 years at the turn of the century, to 62 years in 1935 and to 75 years today. Women who are free of heart disease and cancer at the age of 50 are now predicted to reach an average age of 92 years. In addition, 10 million baby boomers will reach the age of 90, one million of them becoming centenarians (Kongstvedt, 2001). How will we pay for the costly new drugs that continue to receive FDA approval each year? How are prescription drug costs and utilization affecting our society?

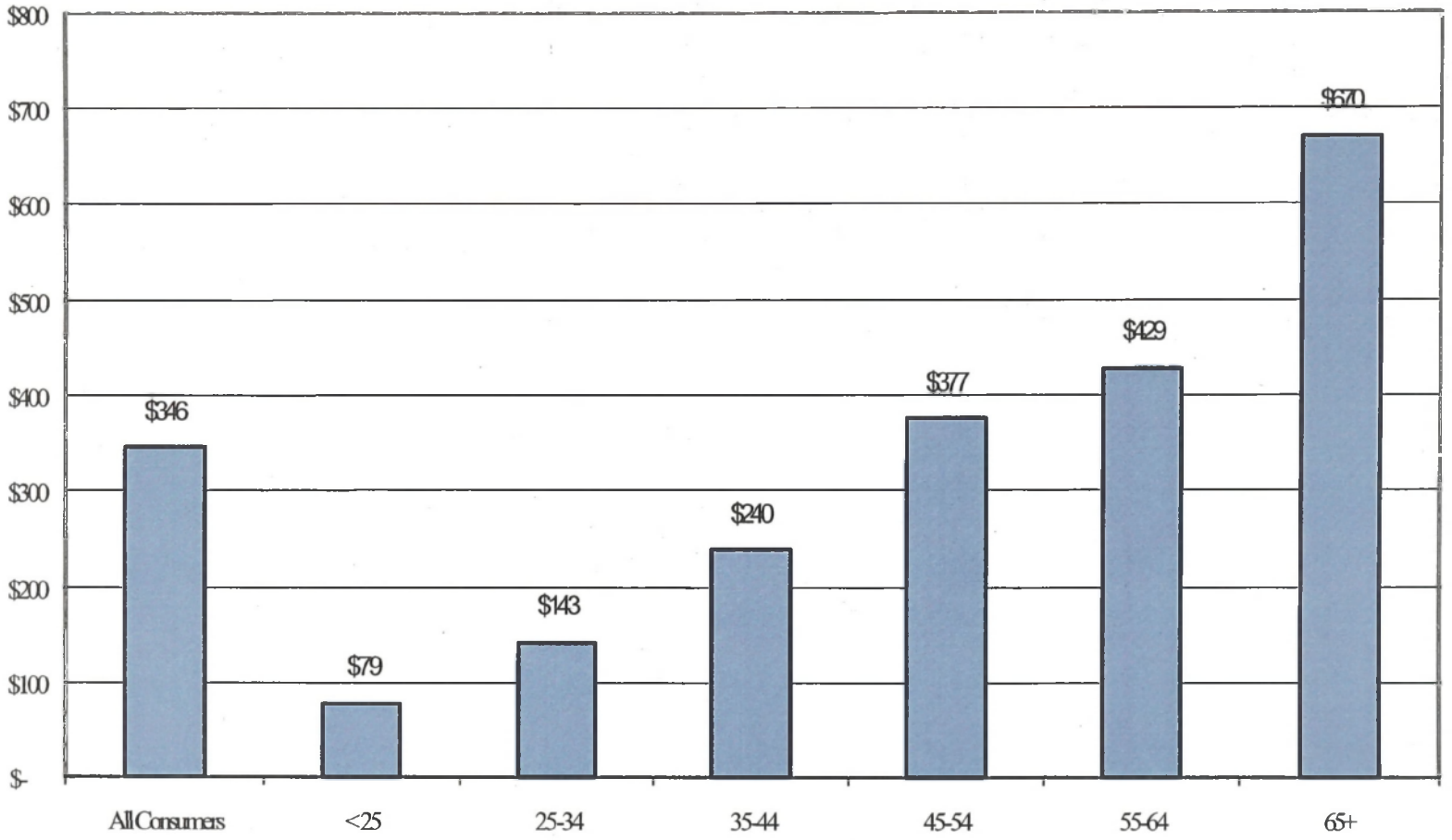
[1] All visuals can be found on the succeeding page

Figure 1: Percent of Total National Prescription Drug Expenditures by Type of Payer, 1990-1998



Source: Health Care Financing Administration (HCFA), 2000

Figure 2: Average Annual Consumer Expenditure for Drugs in Dollars by Age, 1998



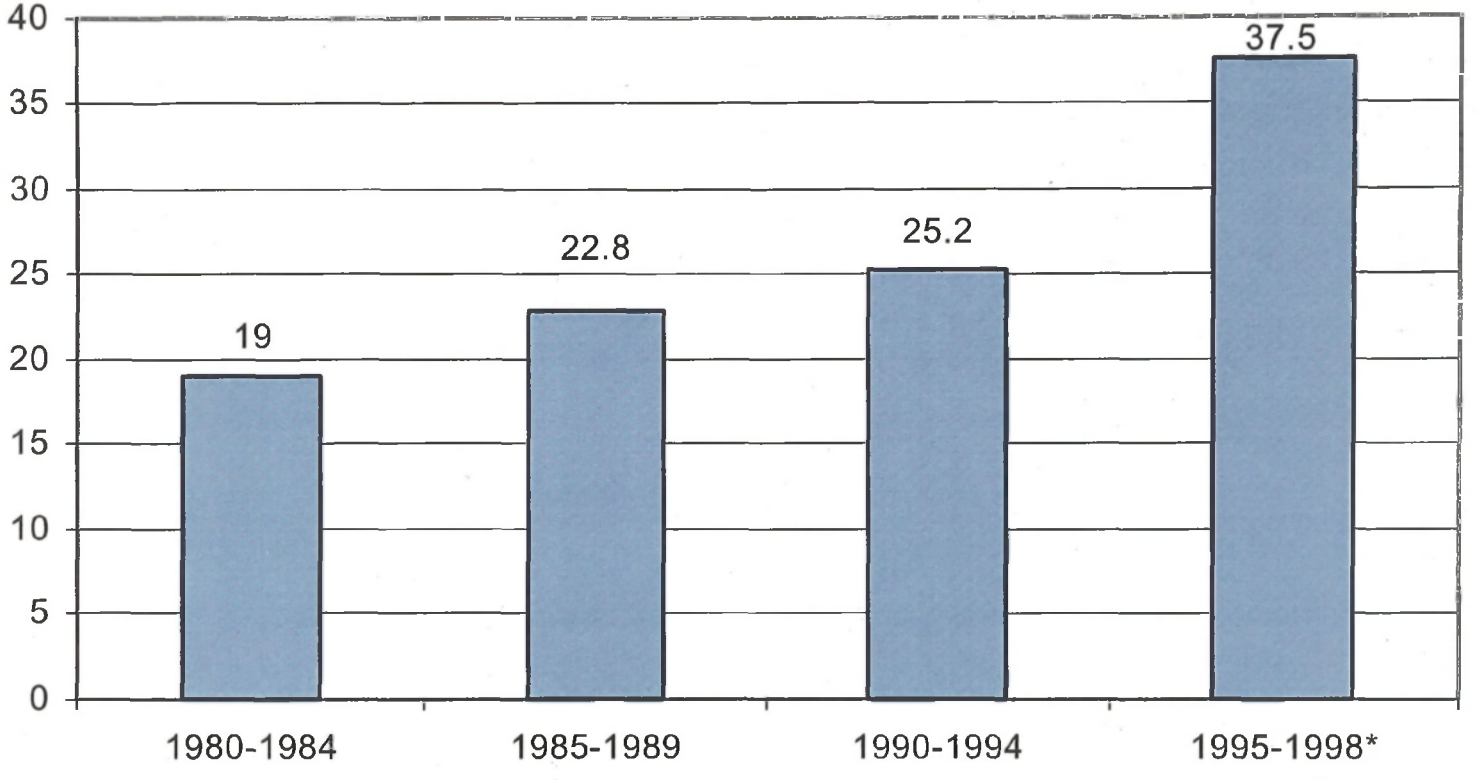
Source: Bureau of Labor Statistics (BLS), Consumer Expenditure Surveys 1998.

New science creates new drugs. This, in turn, gives people new treatment options. Individuals who were previously untreated or under-treated now have the ability to receive treatment. New science creates the basis for more patients entering treatment because the rates of diagnosis and awareness of disease have increased. It is important to note, as survival times lengthen, that the number of patients under treatment will grow, and the number of prescriptions written will also continue to grow (Dubois, Chawla, Neslusan, Smith, & Wade, 2000).

To demonstrate the importance of the role new drugs play in the dramatic increase in prescription drug utilization, drugs introduced since 1992 accounted for over 40% of prescription drug costs and over 25% of prescription drug utilization in 1999. According to Kleinke (2000), "Pharmaceutical companies believe that having more patients using newer, better drugs serves to offset other medical costs in excess of the incremental pharmacy costs" (p. 80). The introduction of new drugs will continue to increase over the next five years--increasing utilization and costs. Figure 3 shows the average annual number of new drugs approved by the FDA from 1990-1998. In addition to the increased number of new prescription drugs coming to the market, the FDA is approving prescription drugs at a faster rate each year (figure 4).

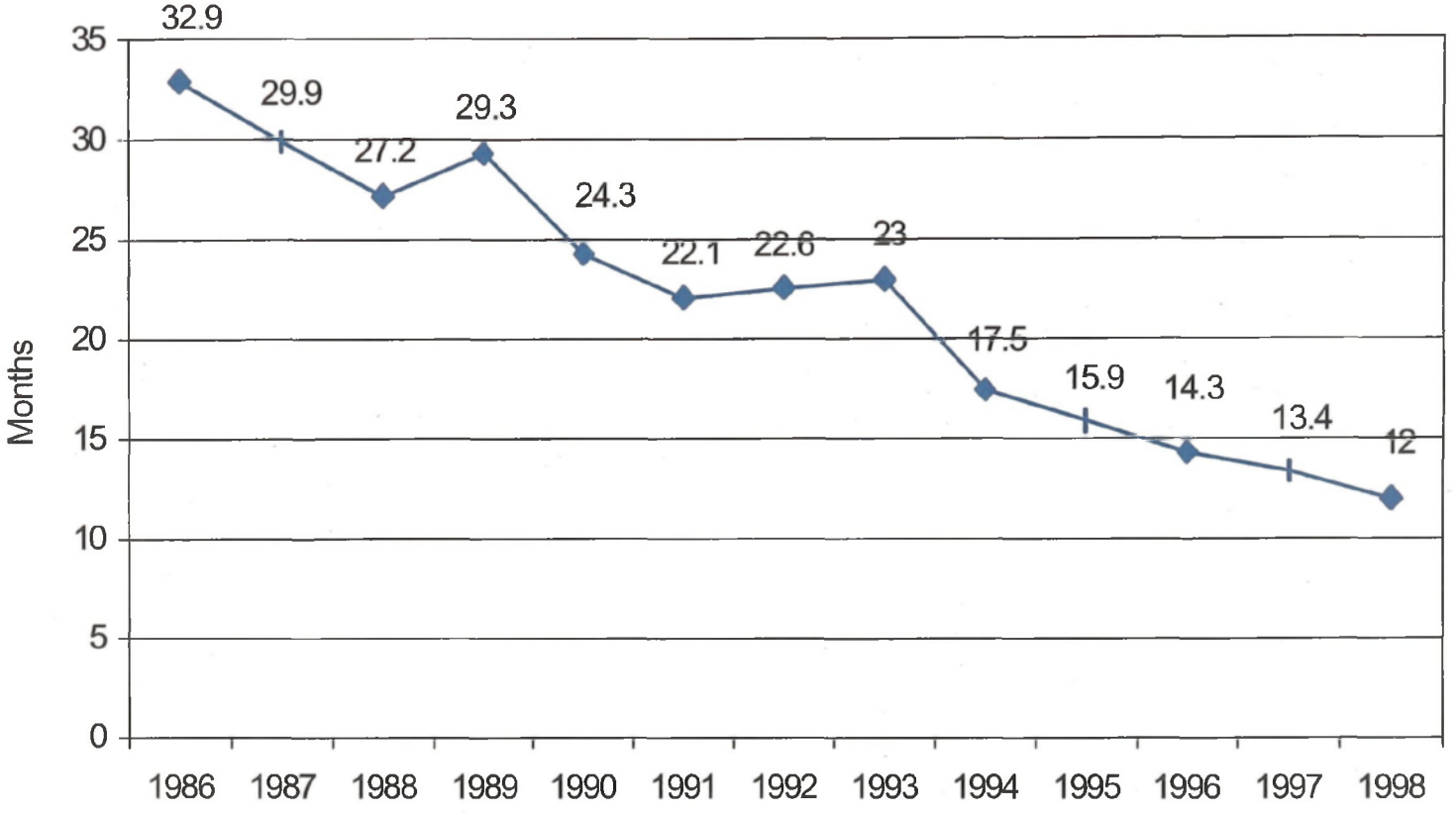
In 1997, the FDA issued a draft proposal for new guidelines on direct-to-consumer (DTC) advertising. For the first time, manufactures were allowed to provide both the drug's name and the condition it treats without disclosing all of the product's risks (Wilkes, Bell, & Kravitz, 2000). As figure 5 demonstrates, the number of prescriptions written in 1998 (the year after the new FDA guidelines) increased from 2.4 billion in 1997 to 2.6 billion in 1998, an 8.3% increase. This is important information

Figure 3: Average Annual Number of New Drug Approvals for Medical Entities (NME'S) 1980-1998



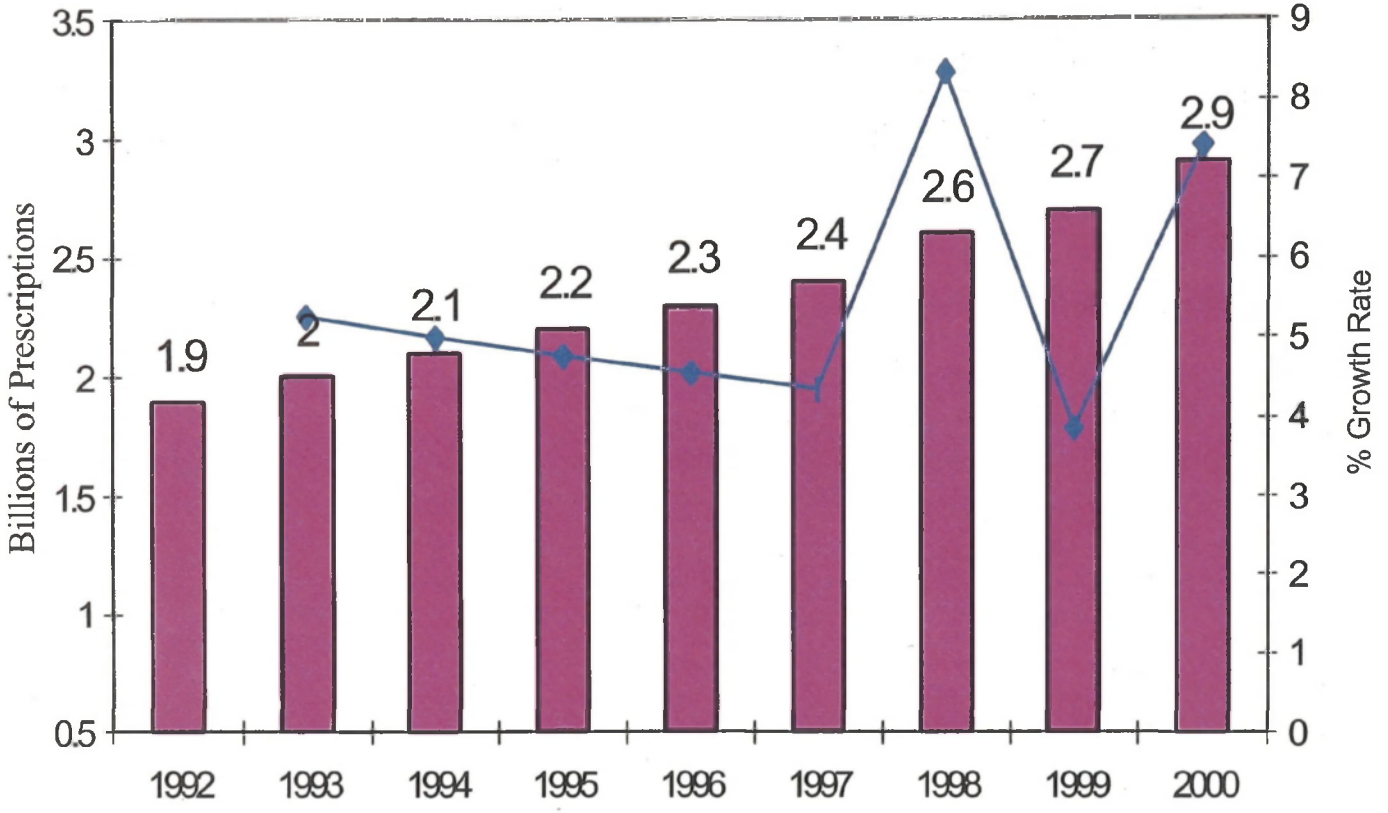
* 1995-1998 represents a 4 year time period, all other groupings include 5 years.
Source: 1999 NWDA Industry Profile and Healthcare Factbook

Figure 4: Length of FDA New Drug Application Review and Approval Time, 1986- 1998



Note: Total time in months of a new drug application to be process by the FDA.
Source: 1999 NWDA Industry Profile and Healthcare Factbook

Figure 5. Utilization and Growth Rate of Prescription Drugs, 1992-2000



Source: National Institute for Health Care Management, Prescription Drug Expenditures in 2000

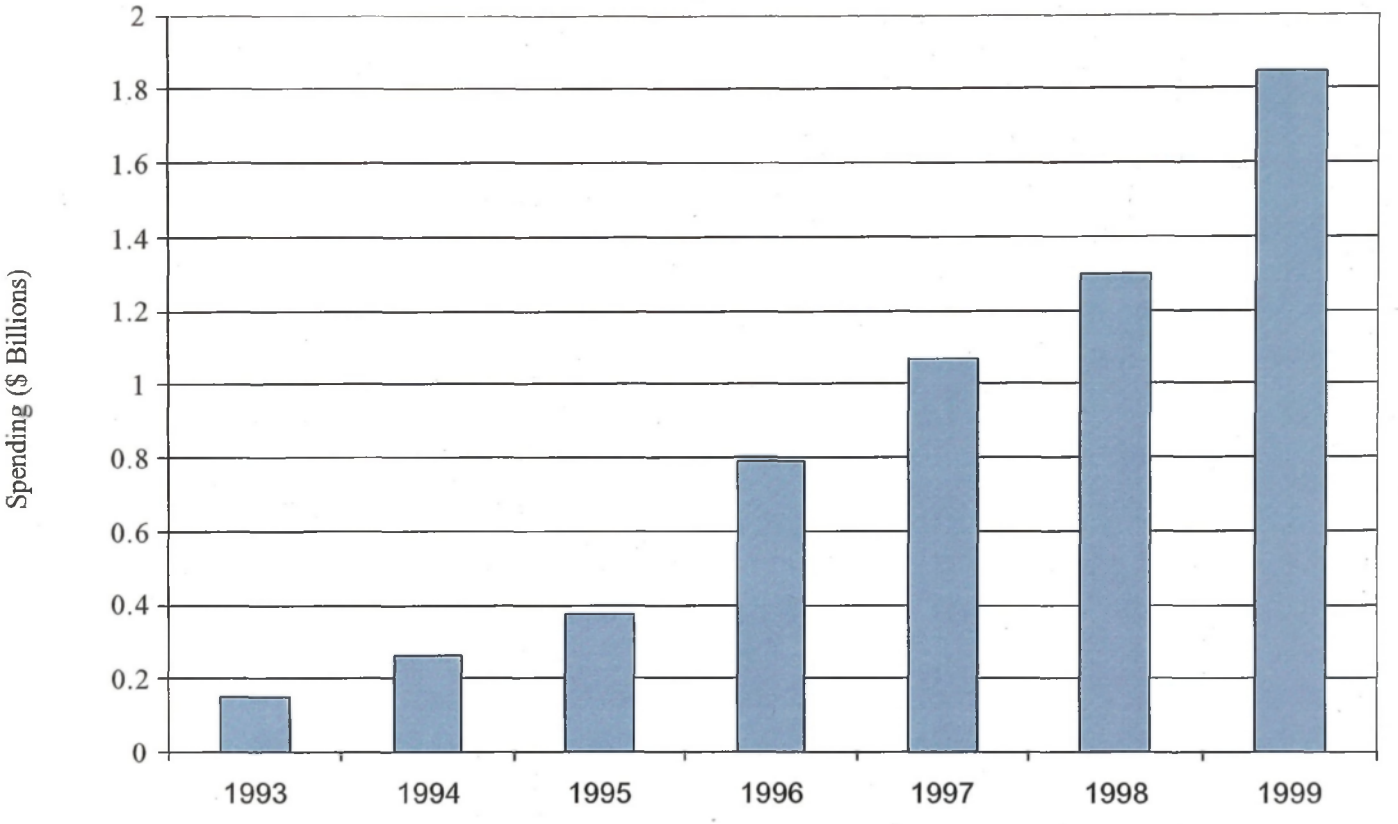
since the rate of prescriptions written was already rising steadily at a rate of approximately 5% and after the new legislation, the rate jumped to over 8% which represents a 60% increase in year over year growth. Consequently, spending on direct-to-consumer advertising has increased from $55 million in 1991 to $1.3 billion in 1998 and almost $2 billion in 1999. (See figure 6). According to Woloshin, Schwartz, Tremmel & Welch, (2001):

> Many pharmaceutical companies have reduced the amount spent on direct-to-physician advertising, which suggests a tactical switch in their focus from physicians to patients. In 2000, drug companies spent more on advertisements in newspapers and popular magazines than they did in medical journals ($685 million versus $473 million respectively) (p.1141).

These ads serve to increase consumer curiosity, leading to patient requests and demands or an increase in demands for prescriptions. Direct advertising by pharmaceutical companies clearly correlates with an increase in the demand for prescription drugs. The question is whether these additional prescriptions are appropriate (Wilkes et al., 2000). A number of experts (Dubois, Chawla, Neslusan, Smith & Wade, 2000) conclude that, through direct advertising to consumers, patient requests have become an increasingly common lever used by the pharmaceutical industry as it seeks to extend profits and delay introduction of generically equivalent products. Woloshin et al., (2001) believe, "Pharmaceutical companies are able to accomplish this by encouraging consumers to believe that a problem might exist (where they previously would not) and that a pharmacological solution is the appropriate way to deal with it" (p. 1145).

Direct-to-consumer advertising will also enter cyberspace. As Findlay (2001) reported,

Figure 6. Direct-To-Consumer Advertising Spending, 1993-1999



Source: Based on IMS Data health analysis of data from competitive media reporting as reported by Findlay, 2001

> Healthcare web sites are already supported in part by prescription drug advertising, although companies spent less than $1 million on such promotion in 1999. That figure will probably grow as the Internet becomes even more popular and advertising in general on the Internet finds a more solid niche. The critical policy question posed by the growth in direct-to-consumer advertising is whether, over time, the benefits of raising consumer awareness of specific (mostly new) prescription drugs and the conditions the medicines treat will outweigh the danger that consumers will begin to demand and use some medicines inappropriately (p.117).

In addition to traditional advertising, the new cyberspace advertising marketplace will only add to the amount of money that pharmaceutical companies spend to promote their products.

In an attempt to control prescription drug spending, cost sharing for prescription pharmaceuticals is now common in all three major markets-- public entitlement programs (Medicaid), private insurance, and managed care (Levy, 1992). Two widely used cost sharing strategies have emerged: instituting employee copayments, and encouraging the use of generic substitutes through differential copayments (Smith, 1993). There are three forms of cost sharing: coinsurance, deductibles, and copayments. Coinsurance represents a provision in a member's coverage that limits the amount of coverage by the plan to a certain percentage, commonly 80%. A deductible represents that portion of a member's health care expenses that must be paid out-of-pocket before any insurance coverage applies (Kongstvedt, 2001). Copayment can be defined as a small fixed charge that is paid by the beneficiary for each unit of service consumed (Reeder & Nelson, 1985).

Prescription Drug Cost Sharing

Cost sharing for prescription drugs has several objectives. One such objective is to pass some of the cost of the prescription onto the consumer. This helps reduce employer payment responsibility and forces the consumer to realize some level of economic responsibility. Another objective is to reduce utilization of prescription drugs by deterring individuals from unnecessary or marginal use of non-essential medications. Copayments are also presumed to inject an element of responsibility back into the drug marketplace. Making the consumer conscious of costs may lead to competition and lower-cost sources (generic drugs) (David, 1994). The purpose of any type of cost sharing provision is to cause the individual to realize the cost associated with the service and to take some economic responsibility. Motheral and Henderson (1999b) reported,

> According to economic theory, if individuals are required to pay a portion of the prescription costs, they will use prescriptions more prudently and will evaluate the need for the medication and also the availability of a less-expensive substitute (generic). Accordingly, the number of prescriptions should fall as the price increases, if other factors are unchanged. This assertion is based on Grossman's derived demand model for medical care. (p. 1384).

The question than becomes, "Is the copayment large enough to cause the consumer to debate the merits of the medication but not too large as to deter utilization of "essential" drugs?" Any free product is bound to be abused since individuals are not punished for misuse, overuse or abuse of the product. In this instance, the "punishment" is economic.

To balance the demands for access to pharmaceuticals with pressures to constrain costs, levels of cost sharing must be set in a manner that achieves appropriate clinical and financial outcomes (Fendrick, Smith, Chernew, & Shah, 2001). This balance raises several important questions. What are the potential adverse affects of copayments for

prescription drugs in an indigent population (Reeder & Nelson, 1985)? Will a copayment create a barrier that prevents an individual from getting a prescription filled, and therefore cause a negative health outcome? Is health status negatively affected by cost sharing? If so, excessive cost sharing measures can reduce prescription drug utilization but raise other health care costs such as emergency room and inpatient hospitalization. Cost sharing, while initially designed to control over-utilization, may also influence the decision to initiate care (Reeder & Nelson, 1985). In some portions of the Medicaid and Medicare populations, it is an economic reality that the cost to fill a prescription may interfere with other essential life activities such as the ability to purchase food. How does one decide between eating and taking medicine? How does cost sharing affect utilization for "essential" and "non-essential" prescription drugs? These are all questions that, when answered, will help us understand both the benefits and limitations of prescription cost sharing. Does the value that a particular drug provides, in relation to other goods or services that are perceived as being necessary to the individual, affect whether the prescribed drug is purchased?

Key Question

What effects do prescription drug copayments have on utilization and associated overall costs in the general population (non-Medicare and non-Medicaid enrollees)?

Review of the Literature

Several studies have examined the effects of prescription drug copayments on utilization. The first was the RAND Health Insurance Experiment (HIE), which investigated alternative forms of healthcare financing through a randomized trial spanning nearly a decade and involving 7,700 insured individuals across the U.S. Study participants were randomly assigned to insurance plans with varying copayment, deductible and maximum expenditure levels (Reeder et al., 1993). The purpose of the study was to determine the effects of cost sharing on the utilization of medical services and expenditures (Newhouse et al., 1981). Results of the RAND study indicated that, "individuals with more generous insurance buy more prescription drugs" (Leibowitz, Manning, & Newhouse, 1985, p.1063).

Using RAND (HIE) data, Leibowitz, Manning and Newhouse (1985), were able to estimate how cost-sharing affects the use of prescription drugs. The findings of the study show that individuals with more generous insurance coverage buy more prescription drugs but that the proportion of brand name drugs among all drugs purchased in pharmacies was not a function of insurance plan. This seems to make sense since health insurance covered the majority, if not all, of the cost of a prescription in 1985 and there were no concerns about steering people from a brand to a generic during that time period. Independent variables for the experiment included: insurance plan coinsurance, location of the individuals involved in the study and demographics of the individuals

(age, sex). Dependent variables included: the number of prescriptions per capita, percentage of drugs purchased through physicians and percentage of generic drugs purchased at pharmacies. This study provides importance research for this thesis in that it tests whether individuals with "less generous" insurance try to minimize their out-of-pocket expenses when purchasing prescription drugs.

Harris, Stergachis & Reid (1990), studied the effects of drug copayments on utilization and costs of pharmaceuticals in a Health Maintenance Organization. The data set consisted of a continuously enrolled cohort of HMO members at Group Health Cooperative of Puget Sound (GHC). The independent variable (copayment) was compared to the dependent variables: number of prescription drugs dispensed, drug ingredient cost, average drug cost per prescription to the GHC and an evaluation of therapeutic classes of drug utilization. Comparing variations in "essential" and "non-essential" utilization, the authors varied the copayment amounts from $0 to $1.50 to $3.00 to $5.00 in an HMO to see the variation in costs and utilization. The results of the study indicate that cost sharing has a significant impact on reducing drug utilization and drug expenditures. "During the entire four-year follow-up period (including base-line), the copayment cohort experienced a reduction in drug use (-11% unadjusted) while drug use in the comparison cohort continued upward (+15% unadjusted)" (p.912). This study supports Motheral and Henderson's economic theory that a copayment will reduce utilization.

Trying to answer the same question, Dean Smith (1993), evaluated the use and cost effect of prescription drug copayments. The null hypothesis of this study is that "variation in use and cost of prescription drugs is not associated with copayments or

incentives for generic substitution" (p.192). The independent variable of the study is copayment amount and the dependent variables are: total cost per prescription, ingredient cost per prescription, dispensing cost per prescription, employer costs, and claims. The results of the study indicate that "higher copayment rates are associated with significantly lower numbers of prescriptions per person, and nearly offset higher ingredient costs per prescription" (p. 194). In addition, the presence of a generic drug option is associated with significantly lower total costs, which is due to the lower costs for generic ingredients. This study suggests "marginal changes in copayment rates and incentives for use of generic drugs are not likely to affect either total drug costs or the trend in total drug costs in a meaningful and continuous manner" (p.196). What the copayment does affect is the composition of total drug costs (a larger portion shifted from the health plan to the consumer), a decrease in the cost of the insurance for the employer and a 5% decrease in the number of prescriptions. Smith suggests additional ways of controlling prescription drug costs through the implementation of drug utilization reviews, pharmacist incentives to offer generic drugs and changing dispensing fees as well as more direct actions aimed at pharmaceutical manufacturers.

Motheral and Henderson (1999b), examined the effects of a copayment increase on several key measures when a co-payment increase from $10 to $15 occurred for brand drugs. "The dependent variables were selected to assess the effect of a co-pay increase on 1) utilization and expenditure, 2) compliance with chronic medications and 3) whether the effect of the copay increase varied with the type of medication" (p.1385). The independent variables were age, sex and chronic disease score, which was calculated for a specific period of time. This study found that " an increase in brand co-pay from $10 to

$15 was associated with reduced brand utilization and expenditures, reduced overall expenditures and increased generic utilization without a reduction in continuation with chronic medications" (p.1392). These studies are important to this research because the ability to steer people to generic drugs can have major cost saving implications without reducing utilization or compliance.

Generic companies fill only about 42 percent of all drug prescriptions in this country. This is surprising because the price disparity with brand name drugs is striking. The generic market share accounted for slightly less than $20 billion in drug sales in 1999; the brand company sales accounted for more than $90 billion. Industry advocates claim that if generic sales inched up to 52%, American consumers would save an estimated $11 billion a year in drug costs (Hall, 2001). The question is how to get consumers to switch from a brand name drug to a generic drug. Copayments by themselves are probably not enough, and this raises the question of how a closed formulary might help to reduce utilization of costly "non-essential" prescribed drugs? A closed formulary is a listing of drugs that a physician may prescribe (i.e., a list of drugs approved for use within a health care setting). The physician is requested or required to use only formulary drugs unless there is a valid medical reason to use non-formulary drugs (Knogstvedt, 2001).

Motheral and Henderson (1999a), addressed the question of the effects of closed formularies on prescription drug use and costs through the examination of pharmaceutical usage and spending within a closed formulary. The objective of the study was to examine the effect of a closed formulary on pharmaceutical use, expenditures, and treatment continuation in a general population of children and adults compared to a

control group. Independent variables included formulary (vs. control group) member age, member gender and CDC. Some of the dependent variables included 20 therapeutic classes of drugs, generic fill rate, average cost per claim, total number of generic and brand claims, etc. The findings of the study show,

> The number of people who had claims for prescription drugs decreased from the pre- to post-implementation period for the formulary group and that the formulary group experienced a decrease in total cost, brand cost, total claims, brand claims and generic claims, while the control group showed an increase (p. 484).

The results of the data indicate that a closed formulary can result in substantial savings to the payer, primarily due to a reduction in the use of brand medications, as well as a reduction in the utilization of discretionary drugs. In addition, their findings have implications for the design of future prescription drug benefits.

Looking beyond the prescription copay, Hillman et al., (1999), published a study examining financial incentives and drug spending in managed care. The purpose of the study was to "examine not only the impact of cost sharing on the amount of drug use but also the impact of the prices patients pay for a closely related service, the physician visit" (p. 190). The independent variables included the type of managed care plan, prescription drug copayment and physician office visit copayment. Dependent variables included probability of claims, amount of spending for persons with at least one pharmaceutical claim and predicted amount of spending on pharmaceuticals for all persons. The study found that higher copayments for physician visits, as well as higher copayments for prescription drugs, were associated with lower drug spending. The results of the study indicate that high copayments were associated with low probability of having any pharmacy claims. This result is expected, because the large copayment will absorb the

entire cost of the prescribed medication and eliminate the managed care organization's claims responsibility. In addition, the study found that physicians with low motivation to curb drug spending, as in the IPA model of managed care, were more willing to write prescriptions. Conversely, direct financial incentives for physicians to control drug use, as in the network model of managed care, may have encouraged physicians to prescribe only essential drugs.

Breaking down the utilization of prescription drugs when a copayment is instituted, Reeder and Nelson (1985), studied the effect of copayments in the Medicaid population on several different therapeutic classes of drugs. The study produced surprising results, "copayments appear to exert a differential effect on the utilization of drugs in various therapeutic categories" (p. 400). While the imposition of a copayment had no apparent effect on the utilization of certain therapeutic classes (drugs used to control pain and sleep aids), the most shocking result was that individuals on cardiovascular drugs showed a reduction in utilization with the implementation of a co-payment.

Dubois et al., (2000), examined price and volume factors that influence the level of, and growth in, spending on prescription drugs. In answering the question, how much spending is driven by price rather than volume, the results of the study indicate that "volume, not price, is the largest driver of drug spending" (p. 231).

Separating pharmacy spending into price and utilization components, Chernew, Smith, Kirking, and Fendrick (2001), observed that utilization, as opposed to price, was the primary determinant of increased pharmaceutical expenditure in HMOs. Rising prices were not the primary driver of cost growth. "Over the two-year study, price growth was

relatively modest, about 4%. Instead what drove expenditure increase was a dramatic shift in utilization patterns. Among HMO members, use of new products contributed significantly to cost growth, but use of core products also rose substantially" (p.672). One would expect new products to be the most costly and drive prescription drug costs since they are patent protected and the demand for them will be greater than existing products due to their newness to the market.

All of these studies are important for this thesis in that they may help to create a more cost-effective formulary, or lead to a better designed copayment system based on therapeutic class rather than a generic versus brand tiered copayment system.

This research is important to employers and the American public because of questions such as: At what amount does a copayment become a deterrent to the use of prescription drugs? How do prescription drug costs affect other health care services? How do prescription drug copayments affect the utilization of different therapeutic classes of medications? All of these questions and many others need to be researched and answered. We do not want to create barriers that actually prevent care or act as a deterrent to an individual's ability to obtain necessary, cost effective health care service.

Hypotheses

The purpose of this study is to examine the effect that a change in prescription drug copayments has on drug costs and utilization. Understanding whether cost growth is attributable to changes in copayment levels, changes in prescription drug ingredient cost or changes in prescribing patterns and quantities, is essential to target efforts to contain expenditures. To statistically evaluate the effect of copayments, the following null hypotheses are considered in this study.

Ho_1: A $5.00 increase in prescription drug copayment will have no effect on overall utilization (number of prescriptions) of prescription drugs.

Ho_2: A $5.00 increase in prescription drug copayment will have no effect on the cost of the prescription drugs to the HMO.

Study Design

To empirically examine the effect of prescription drug copayments on cost and utilization in the general population, a time series, cross-sectional, cohort study is used. This thesis study will compare prescription drug cost and utilization changes resulting from a pre and post prescription drug copay change. The sample was obtained from a network model Mid-west Health Maintenance Organization and includes a random sample of 2,389 members from one large employer group, which changed its prescription drug copayment from $0.00 in 1998 to $5.00 in 1999. Individual member claims will be examined on a pre and post change basis for utilization and cost variations. The following variables have been selected to assess the effect of a copayment on 1) utilization and 2) costs:

- Total claims per member per year
- Ingredient cost per member per year,
- Fill fee per member per year,
- Add in fee per member per year,
- HMO drug costs per member per year,
- Total drug costs per member per year and,
- Generic fill rate.

This research will address key questions including, "How does an increase in a prescription drug copayment affect cost and utilization?" "How does a copayment affect utilization among generic and brand drugs?"

Population Demographics of Data

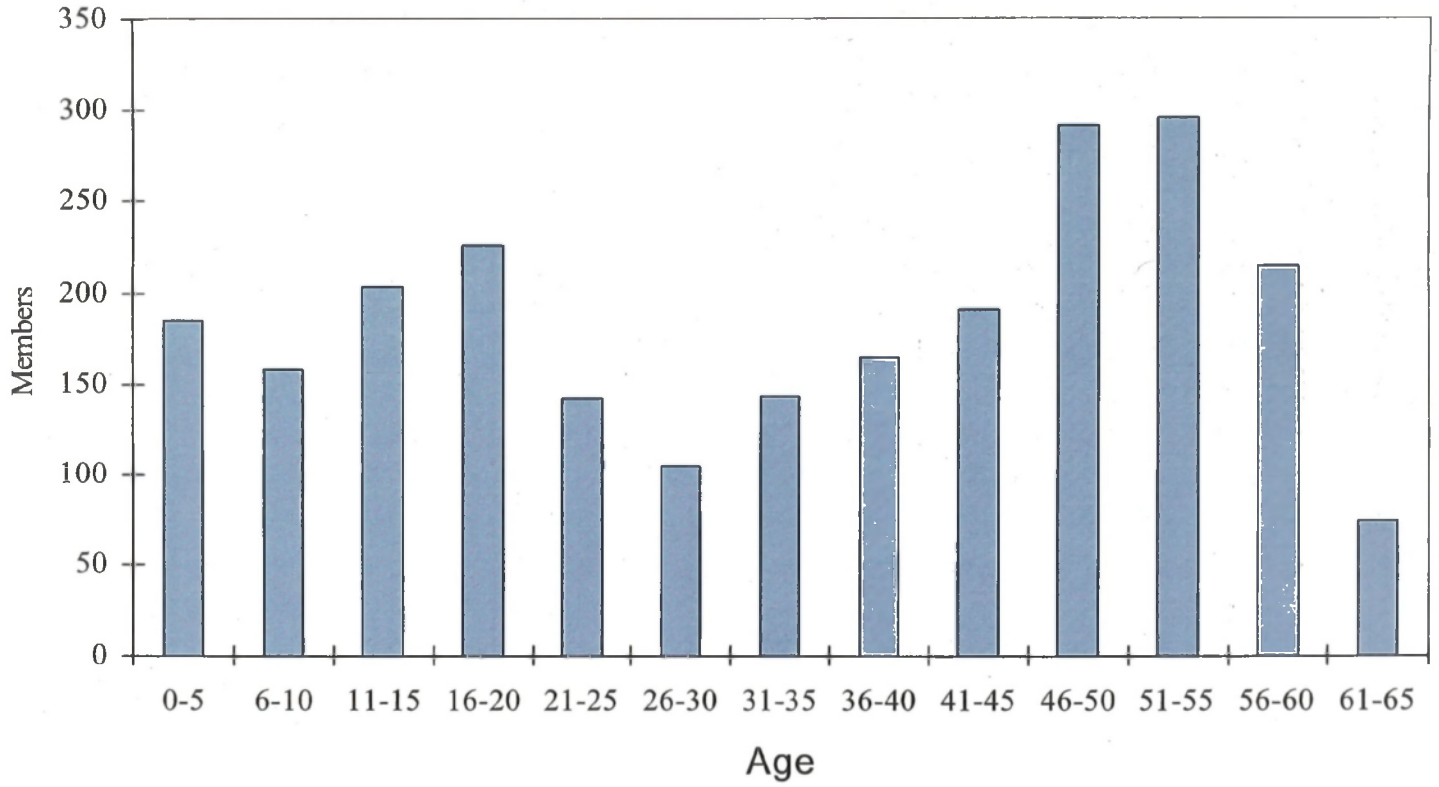
For an individual member to be eligible for the study he/she must have been continuously enrolled in the plan from 1/1/98-12/31/99. From an overall population of 10,456 individuals, 2,389 individuals were found to have been continuously enrolled in the plan. A demographic breakdown of these 2,389 individuals by age and sex is presented below in table 1.

Table 1: Characteristics of Study Group

Age Range	Number of Males	Number of Females	Total	% Individuals
0-5	109	76	185	7.7%
6-10	77	81	158	6.6%
11-15	100	103	203	8.5%
16-20	116	109	225	9.4%
21-25	77	65	142	5.9%
26-30	36	69	105	4.4%
31-35	70	73	143	6.0%
36-40	75	89	164	6.9%
41-45	82	108	190	8.0%
46-50	147	144	291	12.2%
51-55	151	144	295	12.3%
56-60	114	100	214	9.0%
61-65	48	26	74	3.1%
Total	1202	1187	2389	100.0%
% of Total	50.3%	49.7%	100%	
Mean	33.6	33.64	33.62	
SD	19.22	18.02	18.63	

See figure 7 for histogram of the study sample.

Figure 7. Age Distribution of the study population



Source: Authors' original data

Operationally Defining the Variables

The following is an operational description of all the variables included in this study.

Add-in-Fee- a discount paid to the HMO by the prescription drug manufacturers which may be based on volume or utilization.

Age- the age of the individual on January 1, 1998.

Brand Drug- the originator drug that receives the initial FDA patent and can not be reproduced by any other manufacturer while under patent. The FDA patent protection time is 17 years.

Copayment- a fee ($0 in 1998 and $5.00 in 1999) charged to every member of the HMO when a prescription drug is purchased.

Fill Fee- a dispensing fee charged by the pharmacy for filling prescriptions. The dispensing fee in 1998 through November 1999 was paid to pharmacies on a tiered incentive basis ranging from $2.50 per fill for those pharmacies with a generic dispensing rate of less than 40% to a maximum dispensing fee of $5.50 for pharmacies with a generic fill rate of greater than 65%. In November 1999, the dispensing fee changed for generic prescriptions to $3.75 regardless of overall generic dispensing rates. The dispensing fee for brand-only medications become $2.50.

Generic Drug- a chemically equivalent copy designed from a brand-name drug whose patent has expired. Typically less expensive and sold under the common name for the drug, rather than the brand name.

Generic Fill Rate- a ratio that describes the number of prescriptions filled with a generic drug versus a brand drug.

HMO prescription drug costs- equals ingredient cost plus fill fee minus add in fee (rebate) minus copayment.

Ingredient Cost- the amount paid to the pharmacy for a prescribed drug.

PMPY- abbreviation for per member per year.

Total prescription drug costs- equals ingredient cost plus fill fee minus add in fee (rebate).

Study Limitations

This study could be questioned on the basis of the sample, which is limited to one employer group who, over the years, has provided exceptionally high levels of benefits for all employees. Salary ranges for the individuals in this study are not necessarily representative of the average income of an individual living in the Midwest. A problem with the ability to generalize these findings to other employer groups may exist since ones ability to purchase drugs is a function of income and this variable is unknown.

Analysis of the Data

In order to test the statistical significance of the effects of a copayment I will be using difference-of-means *t*-tests. The *t*-test is calculated using the standard formula:

$$t = \frac{(\bar{x}_1 - \bar{x}_2)}{((\sigma_1^2/N_1 - 1) + (\sigma_2^2/N_2 - 1))^{.5}}$$

where $\overline{X_1}$ and $\overline{X_2}$ are means for 1998 and 1999 variables (total claims PMPY, brand claims PMPY, generic claims PMPY, total drug costs PMPY, total generic costs PMPY, total brand costs PMPY, HMO total drug costs PMPY, HMO total generic costs PMPY, HMO total brand drug costs PMPY), and σ_1 and σ_2 are the standard deviations of the variables in each year, and N_1 and N_2 represent the sample sizes in each year.

To assess statistical significance, the t-statistic generated from a difference-of-means test will be compared to the critical value from a t-statistic table. The critical value for the 1% level of statistical significance is 2.576. Therefore, a t-statistic from a difference-of-means test must be greater than 2.576 to be considered statistically significant at the 1% level.

Study Findings

Table 2: Difference of Means Analysis

	1998	1999	Percent Change	Difference in the Two Periods
A. Utilization Analysis PMPY				
Generic Drug Claims				
Mean	5.92	5.04	-14.9%	(3.37)***
Standard Dev.	9.45	8.59		
Brand Drug Claims				
Mean	5.56	5.86	5.4%	(0.89)
Standard Dev.	11.48	11.82		
All Claims				
Mean	11.48	10.90	-5.1%	(1.21)
Standard Dev.	16.71	16.32		
B. Total Drug Cost Analysis PMPY				
Generic Drug Cost				
Mean	$ 80.22	$ 80.23	0%	(0.02)
Standard Dev.	$ 14.64	$ 16.69		
Brand Drug Cost				
Mean	$ 317.93	$ 361.69	13.6%	(18.38)***
Standard Dev.	$ 77.84	$ 85.03		
All Drug Cost				
Mean	$ 398.14	$ 445.50	11.9%	(25.82)***
Standard Dev.	$ 59.32	$ 67.22		
C. HMO Total Drug Cost Analysis PMPY				
Generic Cost				
Mean	$ 80.18	$ 59.37	-26.0%	(45.84)***
Standard Dev.	$ 14.64	$ 16.67		
Brand Cost				
Mean	$ 317.74	$ 332.24	4.6%	(6.15)***
Standard Dev.	$ 77.82	$ 85.05		
All Drug Cost				
Mean	$ 397.91	$ 391.61	-1.6%	(3.44)***
Standard Dev.	$ 59.32	$ 61.13		

*** indicates statistical significance at the 1% level, critical value = 2.576.

Difference of Means Analysis (Con't)

		1998		1999	Percent Change	Difference in the Two Periods
D. Cost Component Analysis						
Ingredient Cost PMPY						
Mean	$	377.07	$	427.06	13.3%	(27.08)***
Standard Dev.	$	59.87	$	67.49		
Fill Fee PMPY						
Mean	$	32.76	$	32.06	-2.1%	(17.15)***
Standard Dev.	$	1.42	$	1.40		
Add-In-Fee PMPY						
Mean	$	11.80	$	13.61	15.3%	(16.90)***
Standard Dev.	$	3.61	$	3.79		

*** indicates statistical significance at the 1% level, critical value = 2.576.

Table 3: Generic Fill Rate, 1998 to 1999

	YEAR	RATE
GENERIC FILL RATE	1998	51.6%
GENERIC FILL RATE	1999	46.2%

Empirical Results

Table 2 displays the results of the difference-of-means analysis, which generally shows statistically significant changes in costs but not utilization as the driving factors for the changes in prescription drug expenditures for this health plan.

Panel A shows that generic prescription drug utilization decreased significantly from 5.92 prescriptions per member per year (PMPY) in 1998 to 5.04 prescriptions PMPY in 1999 (t-statistic of 3.37 is significant at the 1% level). Brand drug and overall prescription drug utilization did not change significantly over the same period of time as the insignificant t-statistic indicates. Brand drug utilization increased from 5.56 prescriptions PMPY in 1998 to 5.86 prescriptions PMPY in 1999 but the increase was not statistically significant. Likewise, overall prescription drug utilization decreased from 11.48 prescriptions in 1998 to 10.90 in 1999 but the difference was not statistically significant.

Panel B compares the total drug cost PMPY from 1998 to 1999. The results in Panel B indicate that total drug costs for all prescription drugs, as well as for brand drugs, increase significantly (at the 1% level as the t-statistics indicate) but that generic drug cost did not significantly change. Total drug costs for generic drugs PMPY increased from $80.22 in 1998 to $80.23 in 1999 but the difference is not statistically significant. Total drug costs for brand drugs PMPY significantly increased from $317.93 in 1998 to $361.69 in 1999 with a t-statistic of 18.38 (significant at the 1% level). Total drug costs for all drugs PMPY significantly increased from $398.14 in 1998 and $445.50 in 1999 with a t-statistic of more than 25 (significant at the 1% level).

In comparison, Table 2, Panel C compares HMO total drug costs from 1998 to 1999 for all drugs and shows that, generic drugs and brand drugs changed significantly. HMO total drug costs for generic drugs PMPY significantly decreased (at the 1% level) from $80.18 in 1998 to $59.37 in 1999 as the t-statistic of 45.84 indicates. HMO total drug costs for brand drugs PMPY increased significantly from $317.74 in 1998 to $332.24 in 1999 with a t-statistic of 6.15. HMO total drug costs for all drugs PMPY significantly decreased from $397.91 in 1998 to $391.61 in 1999 with a t-statistic of 3.44.

Table 2, Panel D compares the cost variables that compose the total cost of prescription drugs PMPY. Results indicate that all cost variables significantly changed. Ingredient cost PMPY significantly increased from $377.07 in 1998 to $427.06 in 1999 with a t-statistic of 27.08 (significant at the 1% level). Fill fee PMPY significantly decreased from $32.76 in 1998 to $32.06 in 1999 with a t-statistic of 17.15 (significant at the 1% level). Add-in-fee PMPY significantly increased from $11.80 in 1998 to $13.61 in 1999 with a t-statistic of 16.90.

Table 3 shows a decrease in the generic fill rate of 51.6% in 1998 to 46.2% in 1999.

Discussion of Study Findings

Based on the analysis of the data and the empirical results in Table 2, we can conclude that brand name drug costs, rather than overall utilization, or generic drug costs are the driving factors behind the rapidly rising costs of prescription drugs. The decrease in generic drug use is statistically significant, as shown in Table 2, Panel A, as well as an important concern to the HMO because of the impact on costs. While generic drug utilization decreased 14.9%, total drug utilization only decreased 5.1% and was not statistically significant as shown in table 2, Panel A. The large decrease in generic utilization is offset by an increase in brand drug utilization of 5.4%; however, the increase in brand utilization is not statistically significant. Overall, the prescription drug copayment benefit had no statistically significant effect on drug utilization.

One concern arising from these findings is that the percent of prescriptions filled with generic medication dropped from 51.6% in 1998 to 46.2% in 1999 (see Table 3). If the goal of the copay is to make consumers aware of the cost of their prescriptions, flat copayments did not accomplish this. Consumers seem to be making no distinction between generic drugs, which average $16.70 per claim and brand drugs, which average $61.66 per claim. In addition, the hypothesis that a population consumes more drugs as it ages is not supported by this study. This might be due to an increase in the prescription drug copayment from $0.00 to $5.00, which could have motivated individuals to ask for an increase in the supply of maintenance drugs. An increase of 30 days to 60 days would increase prescription drug costs while reducing overall claims. This would also allow an individual to maximize the amount of drugs received for a single copayment.

This shift in generic to brand utilization helps to explain the increase in total prescription drug expenditures as shown in Table 2, Panel B. Evaluating total drug costs,

generic drugs did not show a statistically significant increase in the cost PMPY. The total cost PMPY for generic drugs did not increase while the cost for brand drugs and total drug cost both had statistically significant increases. Total drug costs for brand drugs increased 13.6% and the total cost for all prescriptions increased 11.9% (see Table2, Panel B). The costs of brand drugs and the increase in the utilization of brand drugs, is driving the HMO's total prescription drug costs.

When considering the effects of an increase in prescription drug copayments we find that HMO drug costs for all drugs decreased significantly after the introduction of the copayment (table 2, panel C). The $5.00 copayment was associated with a significant decrease in generic drug cost by 26% (significant at the 1% level) but brand drug costs significantly increased by 4.6% after the copayment started (significant at the 1% level).

Looking in Table 2, Panel D, at the variables that compose total drug costs, all had statistically significant changes (as the t-statistic indicates) after the introduction of the copayment. Between 1998 and 1999, the ingredient costs for all prescription drugs PMPY increased by 13.3% (significant at the 1% level), which can be explained by the increase in brand drug utilization. The fill fee PMPY decreased significantly by 2.1%, which may have been caused by the new fill fee rates that took effect in November 1999, as well as the change in the mix of drugs filled by the pharmacists. The add-in-fee PMPY increased significantly by 15.3%, most likely again due to the increase in brand drug utilization, which helps offset the tremendous increase in ingredient costs.

Consumer cost-sharing has been a long-standing component of pharmaceutical cost containment policy. Published managed care organization data clearly demonstrate that higher copayments are associated with lower utilization and lower prescription drug

costs (Frendrick et al., 2001). In this study, the increase in copayment from $0 to $5 may not have been adequate to provide sufficient financial incentives to change utilization habits.

In order to lower total prescription drug costs as well as HMO drug costs, switching from a flat copayment to a two tier copayment system ($5 for generic and $10 for brand) could help steer people away from costly brand drugs to generic drugs.

Future Ways to Decrease Cost and Utilization

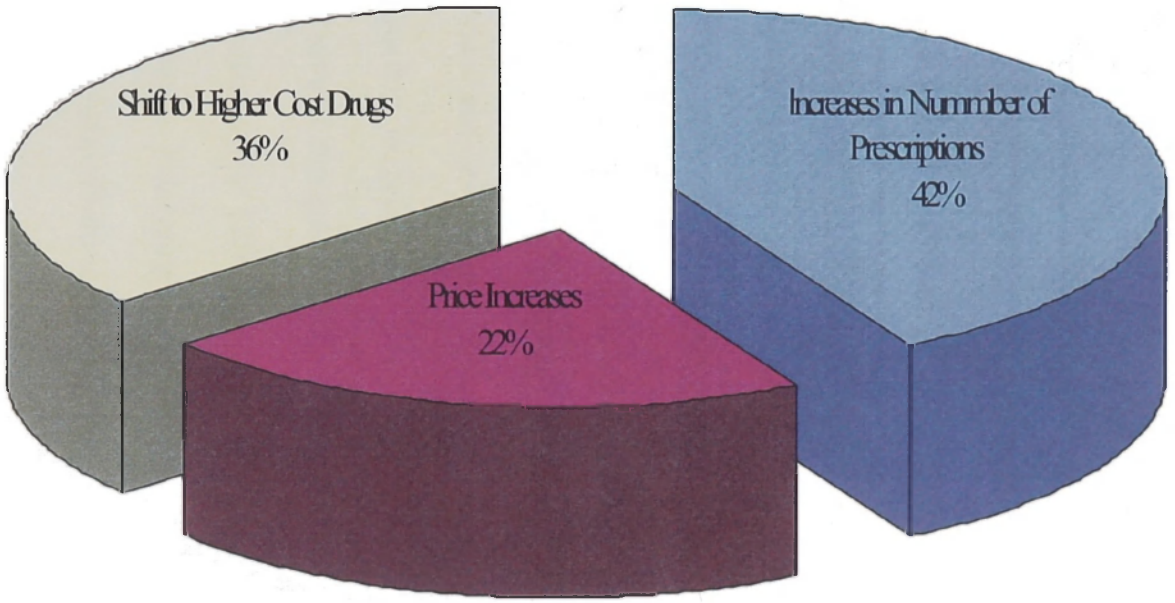
Copayments do not reduce the average cost per prescription drug; they simply pass some of the cost on to the consumer. In order to decrease prescription drug costs, society might consider implementing the following: 3 tier co-payment systems, where the most cost effective drug is the cheapest to purchase, closed formularies, which will eliminate the prescribing of certain drugs, and other creative organizational controls that limit the utilization of expensive non-cost effective drugs but also ensure that individuals who need prescription drugs have affordable access to them. Figure 8 shows that in 1999-2000, approximately 40% of the increase in prescription drug spending was caused by an increase in the number of prescriptions, and that over 50% of the increases were caused by factors such as drug price increase and a shift to higher cost drugs (DBT, 2001). This is why we need to find ways to steer individuals to drugs that are both beneficial and cost effective. Changing utilization patterns alone will not help to control the expenditures on prescription drugs for very long.

Frendrick, Smith, Chernew, and Shah (2001), suggest a new concept called the Benefit-Based Copay (BBC), which builds on the fundamental concept of all drug benefit plans in its desire to provide basic pharmaceutical coverage:

> What distinguishes BBC from existing systems is its determination of the patient's copay based on medical need and costs, as best determined from the available medical and economic evidence. In the BBC, a patient's copay is based on the expected clinical benefit from the prescribed drug. The BBC allows the copay to vary by the evidence-based benefit of the medication for the individual patient (p. 862).

In order to reduce the utilization of costly brand name drugs, the ability to increase brand to generic ratios needs to be further studied and improved. This issue needs to be studied and understood in order to reduce utilization of costly medications.

Figure 8. Factors Contributing to the Increase in Retail Prescription Drug Spending, 1999-2000



Source: Drug Expenditure in 2000: The Upward Trend Continues. A report by the National Institute for Health Care Management, 2001

In addition to increasing prescription copayments, other variables such as implementing better medical practices, educating the American public as well as physicians, and using the Health and Lifestyle departments in managed care organizations need to be examined in order to evaluate their effect on lowering prescription drug utilization. "If volume represents the primary driving force behind drug spending growth, then future research should examine this volume and determine what use is appropriate and what use is not. But this examination must also focus on the impact of medications on the total cost of care and the overall improvement in the patients' well-being" (Dubois et al, 2000). If the increase in the amount of money spent on prescription drugs helps to reduce other health care expenses, such as inpatient hospitalization, then the additional prescription expenditures should be viewed as both beneficial and an overall cost effective means of reducing national health care costs.

The question is, "How do we increase the educational levels of the American public?" Using services such as disease management programs can help create healthier lifestyles and a reduction in prescribed drugs. Increased health education may also reduce utilization of several therapeutic classes of medications such as LDL inhibitors. A better, healthier diet can reduce LDL levels, and possibly eliminate the need for high blood pressure medications. Educating physicians on the costs of prescription drugs and some of the alternative, cost-effective treatments that are available, may reduce costs without affecting utilization.

Roth, Plastaras, Mullin, Fillmore and Moses (2001), studied the effect that educational intervention had on selected expensive medications. The study results showed that "substantial decreases in the prescribing of certain expensive medications

can be attained by substituting less costly medications: this can be accomplished through a simple and cost-effective educational and reminder program " (p. 636). Having HMOs implement some type of physician education program to inform physicians of the costs associated with certain prescription drugs could have a tremendous effect on decreasing prescription drug costs.

Conclusions

Implications for Managed Care

The purpose of this study was to see what effect, if any, an increase in prescription drug copayments would have on utilization and associated costs. Smith and Kirking's (1992) review of the available studies on the relationship between consumer fees and drug utilization suggests that, "the demands for drugs tends to be insensitive to consumer fees. Even income and health needs, two factors that are important determinants of the demand for other goods and services, are not generally significant for drugs, within the scope of research on insured populations" (p. 340). The fact that utilization did not significantly change when a $5 copayment was added is supported by these other studies.

Costs paid by the HMO were significantly reduced by 1.2% from 1998 to 1999 after the implementation of a $5 copay; however, total drug costs increased nearly 12% due to the increase in the number of prescriptions filled with brand drugs rather than generic. The implementation of a copayment simply shifted part of the economic burden from the employer and HMO to the consumer.

Employers, armed with the knowledge that they can offset premium costs by implementing prescription drug copayments, will be able to pass on any costs they feel they cannot absorb without causing the quality of their employee's health care to diminish. This phenomenon is currently occurring throughout the country. Employer sponsored healthcare plans are being forced to raise prescription copayment levels to protect themselves from the double-digit premium increases that insurance companies say they need in order to keep up with medical expenses.

Managed care organizations can benefit from this study by realizing that a flat copayment does not steer people away from costly brand name drugs, and that implementing a two-tier copayment systems could possibly help control utilization of these drugs.

If we expect to enjoy continuing prescription drug coverage through our employers, we need to find ways to control spending, especially when health care expenses continue to skyrocket for both employers and managed care organizations. Cost sharing for prescription drugs seems to be a logical step in making the consumer aware of the tremendous expense associated with the benefit. The only deterrent to cost sharing would be if employers and insurers cross the invisible economic line that causes a decrease in prescription drug utilization but an increase in other health care expenses, such as emergency room visits.

Implications for Public Policy

In the upcoming months, the debate in congress over a national prescription drug program will continue to escalate. Compounding this issue is the fact that Medicare will have to withstand the retirement of 70 million newly eligible baby boomers in the next 10 years, and still lacks an outpatient prescription drug benefit. All of this is taking place as prescription drug costs and utilization continue to escalate dramatically (Rovner, 2001).

Medicare attempts to deliver quality health care. According Ginzberg (1990), this implies that an individual will have adequate insurance coverage to pay for the range of services that a physician believes will contribute optimally to the individual's recovery without exposing him/her to undue risk. Without outpatient prescription drug benefits,

Medicare recipients, most of whom live on fixed incomes, must choose between purchasing essential drugs to maintain their health or paying other necessary bills such as grocery or heating.

I believe that this research can be transferred from the private insurance marketplace to a government-sponsored national prescription drug program. The government has many options available when considering the addition of an outpatient prescription drug program, whether it is a stand alone program or an attachment to the Medicare program. As this study concludes, a nominal copayment can help offset prescription drug costs for the insurance provider without negatively affecting utilization and the quality of care.

Through this study and others that were reviewed in the literature, offering the following benefit options would help to control government expenditures in a national prescription drug program and reduce the current out-of-pocket expenditures presently absorbed by individuals currently covered under Medicare.

- Limiting the formulary: By offering a combination of generic only or the most cost effective treatment options, the government would institute a cost control measure which could help to limit exposure to the costliest drugs. If individuals want a drug not on the formulary, they can pay for the difference in the cost of the drug themselves. This is still better coverage than they currently receive.

- Implementing fixed or percent copayments for all prescription drugs covered under the plan would also help to insulate the government from the rise in prescription drug costs while offsetting some of the initial cost of a prescription. I recommend a percent copayment because this would protect the government from

inflation as well as the rising costs that pharmaceutical companies incur in the production of drugs (advertising, etc).

A national prescription drug benefit program for Medicare recipients would have several potential benefits. One such benefit is that outpatient drug coverage could also reduce unnecessary expenditures in other health care areas such as emergency room utilization, while freeing up monies to pay for other necessary expenditures. Another is that an individual would be receiving the complete health care benefits recommended by their physician.

If the government is to successfully institute a national prescription drug program, limiting the benefits through copayments and reducing the number of prescription drugs on the formulary would be a great way to help the program in its initial developmental phases. A copayment of any amount and a reduced formulary could help to offset costs for individuals on Medicare while providing better coverage and more comprehensive benefits than they currently receive. It would also protect the government from tremendous increases in unnecessary annual expenses, caused by over utilization of the costliest drugs.

These cost-sharing provisions will not help to reduce the amount necessary to set up the program, but some program seems inevitable, especially in light of projected drug costs for the country's aging population. With new drug developments on the increase, the government needs to find a way to make it possible for citizens to purchase the drugs necessary to maintain their health while not causing an undue burden on their wallets.

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